

## Claims

1. An acetylene generation and supply system comprising:  
an acetylene generation device configured to generate acetylene from at least one reactant feed stream including at least one carbon containing material;  
and

5 an acetylene processing device oriented in-line and downstream from the acetylene generation device to receive and process generated acetylene from the acetylene generation device so as to consume at least a portion of the generated acetylene upon operation of the acetylene processing device.

2. The system of claim 1, wherein the acetylene generation device  
10 comprises an arc plasma reactor including an anode and a cathode disposed within the reactor, and a power source connected to the anode and the cathode to generate plasma within the reactor.

3. The system of claim 1, wherein the process device comprises a carburization device including at least one chamber to receive and process steel  
15 components, the carburization device being configured to perform a carburization process including heat treating and quenching the steel components.

4. The system of claim 1, wherein the at least one carbon containing material is at least one of natural gas, coal, methane and C<sub>2</sub>-C<sub>8</sub> alkyl and/or aryl hydrocarbons.

20 5. The system of claim 1, wherein the at least one carbon containing material comprises methane.

6. The system of claim 1, further comprising:  
at least one storage cylinder connectable with the acetylene generation device to received and store acetylene generated by the acetylene generation  
25 device.

7. The system of claim 6, wherein the at least one storage cylinder is free of acetone.

8. The system of claim 6, wherein the at least one storage cylinder is disposed in-line between the acetylene generation device and the acetylene processing device.

9. The system of claim 1, further comprising:  
a purification unit disposed in-line between the acetylene generation device and the acetylene processing device.

10. A method of generating and supplying acetylene, comprising:  
generating acetylene in an acetylene generation device by directing at least one reactant feed stream including at least one carbon containing material into the acetylene generation device;  
directing the generated acetylene to an acetylene processing device disposed in-line and downstream from the acetylene generation device; and  
operating the acetylene processing device to consume at least a portion of the acetylene.

11. The method of claim 10, wherein the acetylene generation device comprises an arc plasma reactor including an anode and a cathode disposed within the reactor, and the acetylene is generated by generating plasma within the reactor via a power supply connected to the anode and the cathode.

12. The method of claim 10, wherein the process device comprises a carburization device, and operation of the carburization device comprises:  
receiving and heat treating steel components within at least one chamber of the carburization device;  
introducing the generated acetylene into the at least one chamber to facilitate absorption and diffusion of carbon at the steel components.

13. The method of claim 10, wherein the at least one carbon containing material is at least one of natural gas, coal, methane and C<sub>2</sub>-C<sub>8</sub> alkyl and/or aryl hydrocarbons.

14. The method of claim 10, wherein the at least one carbon containing material comprises methane.

15. The method of claim 10, further comprising:  
prior to directing the generated acetylene to an acetylene processing device, storing the generated acetylene in at least one storage cylinder.

16. The method of claim 15, wherein the at least one storage cylinder is disposed in-line between the acetylene generation device and the acetylene processing device.

17. The method of claim 15, wherein the at least one storage cylinder is free of acetone.

18. The method of claim 10, further comprising:  
directing the generated acetylene through at least one purification unit prior to directing the generated acetylene to an acetylene processing device.

19. An acetylene generation and supply system comprising:  
a means for generating acetylene utilizing from at least one feed stream including at least one carbon containing material; and  
a means for consuming at least a portion of the generated acetylene;  
wherein the means for consuming is disposed in-line and downstream from the means for generating acetylene.